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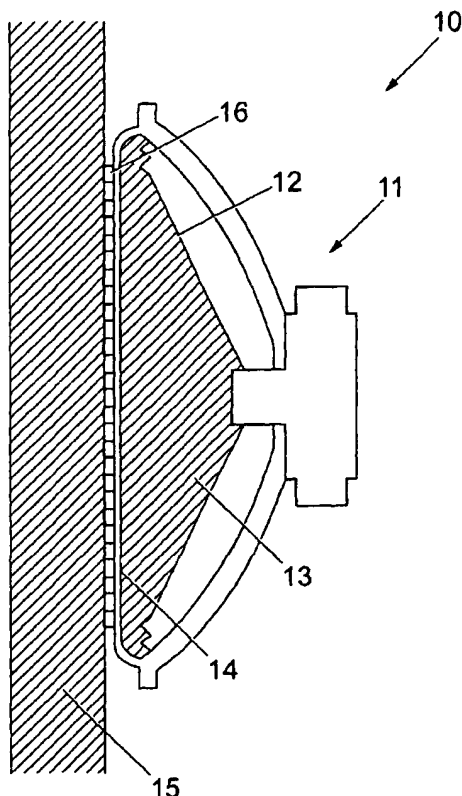
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[Continued on next page]

(54) Title: **SPEAKER ARRANGEMENT**



(57) Abstract: There is described a speaker arrangement (10) which comprises a sound emitting element which is formed of a standard loudspeaker (11) having a cone (12). The cone (12) is filled with a filling material (13) which is inserted into the interior of the cone (12). The loudspeaker (11) can be attached to the rear of a display panel (15) if desired. The loudspeaker (11) is driven by an amplifier which is integrated into circuitry, the circuitry also including an audio input (such as an MP3 player), volume control and a power source. The circuitry can also incorporate further input signals such as signals from activation sensors and signals from a communication device used to update the audio data utilised by the MP3 player. There is also described a method of providing display panels, the display panels incorporating an audio player and speaker, the method comprising the steps of supplying and distributing display panels incorporating a speaker, designing and producing panel graphics to be displayed on the display panels, producing and directing audio messages, producing and distributing of the audio messages to a consumer, and updating and replacing the art work on the graphic panels when necessary.

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*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

**Published:**

- *without international search report and to be republished upon receipt of that report*

1     Speaker Arrangement

2

3     The present invention relates to a speaker  
4     arrangement used particularly, but not exclusively,  
5     to increase the performance of low cost loudspeakers  
6     in concealed or secure applications (such as behind  
7     advertising display panels), where a conventional  
8     speaker grill cannot be used.

9

10    Conventional speaker arrangements for use in such  
11    concealed applications (such as behind advertising  
12    display panels), must be permanently fixed to the  
13    rear surface of the display panel in order to  
14    transmit the sound effectively. If not securely  
15    fixed, poor sound quality results.

16

17    According to the present invention there is provided  
18    a speaker arrangement comprising a sound emitting  
19    element, a filling material engaging the sound  
20    emitting element and defining a first generally  
21    planar surface adapted to abut a second generally  
22    planar surface such that sound is transmitted from

1 the sound emitting element through the filling  
2 material to the second planar surface.

3

4 Preferably, the filling material is inserted into  
5 the interior of the sound emitting element.

6

7 Preferably, the sound emitting element is in the  
8 form of a cone.

9

10 Preferably, the first planar surface is at the base  
11 of the cone.

12

13 Preferably, the second planar surface resonates to  
14 produce sound.

15

16 Preferably the filling material is formed of one of  
17 the following materials:

18 Liquids such as water and water based solutions,  
19 alcohol (e.g. methanol, ethanol), metals (such as  
20 mercury), glycerinates, oils (synthetic, mineral or  
21 vegetable);

22 gels such as gelatines, petroleum, silicon,  
23 polymeric gels;

24 greases such as silicon, graphite, petroleum;

25 elastomers such as silicon rubber, natural

26 rubber/latex, PVC, acrylate cross polymers;

27 solids (powders) such as graphite, iron, talcum.

28

29 Preferably, an intermediate layer is provided  
30 between the first planar surface and the second  
31 planar surface, said intermediate layer acting to  
32 hold the cone against the second planar surface.

1

2 Preferably the intermediate layer is formed of  
3 silicon grease.

4

5 Preferably, the filling material is retained within  
6 the cone by a membrane which is conjoined to the  
7 base of the cone.

8

9 Preferably the membrane is formed of one of the  
10 following materials:  
11 polypropylene, PVC, styrene, PTFE, rubber (natural  
12 or silicon) or cellulose.

13

14 Embodiments of the present invention will now be  
15 described by way of example only, with reference to  
16 the accompanying drawings, where:

17

18 Fig. 1 is an exploded schematic perspective  
19 view of part of the speaker arrangement of the  
20 present invention, viewed from below;

21

22 Fig. 2 is an exploded schematic perspective  
23 view of part of the speaker arrangement of Fig.  
24 1, viewed from above;

25

26 Fig. 3 is a schematic perspective view of part  
27 of the speaker arrangement of the present  
28 invention, viewed from above; and

29

30 Fig. 4 is a schematic cross sectional diagram  
31 of one embodiment the speaker arrangement of  
32 the present invention.

1  
2 Referring to the drawings, there is illustrated a  
3 speaker arrangement 10 which comprises a sound  
4 emitting element which is formed of a standard  
5 loudspeaker 11 having a cone 12. The cone 12 is  
6 filled with a filling material 13 which is inserted  
7 into the interior of the cone 12.

8  
9 The filling material 13 fills the interior of the  
10 cone 12 and defines a first planar surface at the  
11 base of the cone 12.

12  
13 The filling material 13 is retained in place by a  
14 membrane 14 which is joined to the base end of the  
15 cone 12.

16  
17 The first planar surface abuts against a second  
18 planar surface (such as the rear side of a graphic  
19 display panel 15) by way of an intermediate layer 16  
20 which is provided between the first planar surface  
21 and the second planar surface. The intermediate  
22 layer 16 acts to removeably attach the loudspeaker  
23 11 (with the filling material 13 inserted) to the  
24 rear of the display panel 15. The loudspeaker 11  
25 may also be permanently attached to the rear of the  
26 display panel 15 if desired. The speaker  
27 arrangement 10 can also operate with no membrane 14  
28 and/or no intermediate layer 16.

29  
30 The first planar surface of the filling material 13  
31 can protrude slightly from the base of the cone 12  
32 to define an expansion gap around the perimeter of

1 the base of the cone 12, between the base of the  
2 cone 12 and the second planar surface.

3

4 The invention has broad applications and alternative  
5 uses are envisaged for the loudspeaker 11 having the  
6 filling material 13 inserted, for example, instead  
7 of being used at the rear of a display panel 15, the  
8 loudspeaker 11 could be attached to the rear of wall  
9 panels, plasterboard, glass, wood, tiles or any  
10 other surface. The loudspeaker 11 with fill  
11 material 13 inserted is particularly useful in  
12 concealed location where it is preferable that no  
13 hole is cut in the mounting surface to hold the  
14 speaker and where it is desirable not to have a  
15 visible speaker grill, such as for cases where  
16 aesthetic or security considerations must be taken  
17 into account.

18

19 There are many envisaged materials which could be  
20 used in the forming of the speaker arrangement 11,  
21 some of these are listed below:

22

23 The filling material 13 may be formed of one of the  
24 following materials:

25 Liquids such as water and water based solutions,  
26 alcohol (e.g. methanol, ethanol), metals (such as  
27 mercury), glycerinates, oils (synthetic, mineral or  
28 vegetable);  
29 gels such as gelatines, petroleum, silicon,  
30 polymeric gels;  
31 greases such as silicon, graphite, petroleum;

1 elastomers such as silicon rubber, natural  
2 rubber/latex, PVC, acrylate cross polymers;  
3 solids (powders) such as graphite, iron, talcum.  
4

5 Alternatively, it is also envisaged that pressurised  
6 gas could be utilised as the filling material 13,  
7 the membrane 14 acting to contain the pressurised  
8 gas within the cone 12.

9  
10 The intermediate layer 16 may be formed of silicon  
11 grease.  
12

13 The membrane 14 may be formed of one of the  
14 following materials:  
15 polypropylene, PVC, styrene, PTFE, rubber (natural  
16 or silicon) or cellulose.  
17

18 The cone 12 may be formed of one of the following  
19 materials:  
20 Polypropylene, Mylar, Kevlar, Carbon Fibre,  
21 Aluminium, Polycarbonate, Styrene or paper.  
22

23 The loudspeaker 11 is driven by an amplifier (not  
24 shown) which is integrated into circuitry, the  
25 circuitry also including an audio input (such as an  
26 MP3 player), volume control and a power source. The  
27 circuitry can also incorporate further input signals  
28 such as signals from activation sensors and signals  
29 from a communication device used to update the audio  
30 data utilised by the MP3 player.  
31



1 In use in the specific application of the graphic  
2 display panel, the speaker arrangement 10 is  
3 connected to the rear of the display panel 15. The  
4 loudspeaker 11 is connected to the amplifier  
5 (incorporated into the circuitry). Optional sensors  
6 can also be connected to the circuitry to provide an  
7 interactive element to the display panel 15. For  
8 example, the sensors may activate the audio input  
9 when they detect the motion of a person passing the  
10 display panel 15, detect the touch of a specific  
11 area of the display panel or may be set to activate  
12 the audio input on a time dependent loop.

13

14 The MP3 player on the circuitry is loaded with audio  
15 data, such as an advertising trailer. Multiple  
16 advertising trailers can be stored for use and  
17 different advertising trailers may be loaded to  
18 activate corresponding to specific sensors which are  
19 activated.

20

21 When activated, the MP3 player and the amplifier are  
22 adapted, by way of circuitry, to send a signal to  
23 the loudspeaker 11 which drives the loudspeaker 11  
24 to emit a sound. This sound passes through the  
25 filling material 13, the membrane 14 and the  
26 intermediate layer 16 and is transmitted to the  
27 display panel 15, which resonates to produce sound.

28

29 It has been found that the sound quality of the  
30 sound emitted from the resonating display panel 15  
31 when using the loudspeaker 11 filled with the  
32 filling material 13 is greatly enhanced over the use

1 of a speaker having no filling material 13, both the  
2 bass and the mid range responses are enhanced.

3

4 The MP3 audio input used may be substituted for any  
5 other suitable form of audio input such as, for  
6 example, compact disc, mini-disc or microphone.

7

8 Modifications and improvements may be made to the  
9 foregoing without departing from the scope of the  
10 present invention.

11

12 The speaker arrangement of the invention can be  
13 advantageously used in a method of providing display  
14 panels. Accordingly there is also provided a method  
15 of providing display panels, the display panels  
16 incorporating an audio player and speaker, the  
17 method comprising the steps of supplying and  
18 distributing display panels incorporating a speaker,  
19 designing and producing panel graphics to be  
20 displayed on the display panels, producing and  
21 directing audio messages, producing and distributing  
22 of the audio messages to a consumer, and updating  
23 and replacing the art work on the graphic panels  
24 when necessary.

25

26 Preferably, the audio messages are in MP3 format and  
27 can be updated and/or distributed via the Internet,  
28 Intranet, by modem link or by mobile telephone  
29 connection or any other communication link.

30

31 The method of providing display panels as  
32 illustrated in Fig.5. is a turnkey system where all

1 the customers needs in obtaining and maintaining  
2 display panels are catered for.

3

4 The method comprises the steps of the supply and  
5 distribution of speaker display panels (such as  
6 those described above), the origination and  
7 production of panel graphics, the production and  
8 direction of audio messages, the production and  
9 distribution of audio message updates and  
10 distribution of these updates via a communication  
11 device such as the internet, and the updating and  
12 replacement of the artwork on the display panels.

13

14 Modifications and improvements may be made to the  
15 foregoing without departing from the scope of the  
16 present invention.

1     Claims

2

3     1.   A speaker arrangement comprising a sound  
4     emitting element, a filling material engaging the  
5     sound emitting element and defining a first  
6     generally planar surface adapted to abut a second  
7     generally planar surface such that sound is  
8     transmitted from the sound emitting element through  
9     the filling material to the second planar surface.

10

11    2.   A speaker arrangement as claimed in Claim 1,  
12    wherein the filling material is inserted into the  
13    interior of the sound emitting element.

14

15    3.   A speaker arrangement as claimed in Claim 1 or  
16    Claim 2, wherein the sound emitting element is in  
17    the form of a cone.

18

19    4.   A speaker arrangement as claimed in Claim 3,  
20    wherein the first planar surface is at the base of  
21    the cone.

22

23    5.   A speaker arrangement as claimed in any  
24    preceding claim, wherein the second planar surface  
25    resonates to produce sound.

26

27    6.   A speaker arrangement as claimed in any  
28    preceding claim, wherein the filling material is  
29    selected from one of the following materials:  
30    liquids; gels; alcohols; metals; oils; greases;  
31    elastomers; solids; powders.

32

1     7.    A speaker arrangement as claimed in any  
2     preceding claim, wherein the filling material is  
3     selected from one of the following materials:  
4     water; water based solutions; methanol; ethanol;  
5     mercury; glycerinates; synthetic oils, mineral oils  
6     or vegetable oils; gelatines; petroleum gel; silicon  
7     gel; polymeric gels; silicon grease; graphite  
8     grease; petroleum grease; silicon rubber; natural  
9     rubber/latex; PVC; acrylate cross polymers;  
10    graphite solids; iron solids; talcum.

11

12    8.    A speaker arrangement as claimed in any  
13    preceding claim, wherein an intermediate layer is  
14    provided between the first planar surface and the  
15    second planar surface.

16

17    9.    A speaker arrangement as claimed in Claim 8,  
18    wherein the intermediate layer is formed of silicon  
19    grease.

20

21    10.   A speaker arrangement as claimed in any of  
22    Claims 3 to 9 when dependent upon Claim 3, wherein  
23    the filling material is retained within the sound  
24    emitting element by a membrane.

25

26    11.   A speaker arrangement as claimed in Claim 10,  
27    wherein the membrane is formed of one of the  
28    following materials:  
29    polypropylene, PVC, styrene, PTFE, rubber (natural  
30    or silicon) or cellulose.

31

1 12. A method of providing display panels, the  
2 display panels incorporating an audio player and  
3 speaker, the method comprising the steps of  
4 supplying and distributing display panels  
5 incorporating a speaker, designing and producing  
6 panel graphics to be displayed on the display  
7 panels, producing and directing audio messages,  
8 producing and distributing of the audio messages to  
9 a consumer, and updating and replacing the art work  
10 on the graphic panels when necessary.

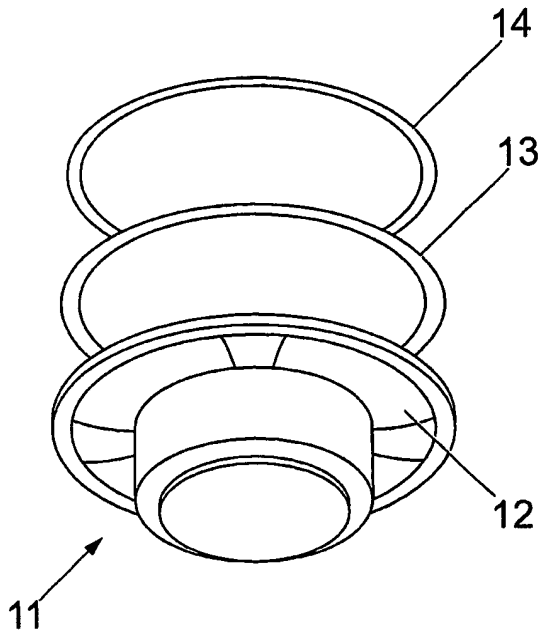
11

12 13. A method as claimed in Claim 11, wherein the  
13 audio messages are in MP3 format and can be updated  
14 or distributed via a communication link.

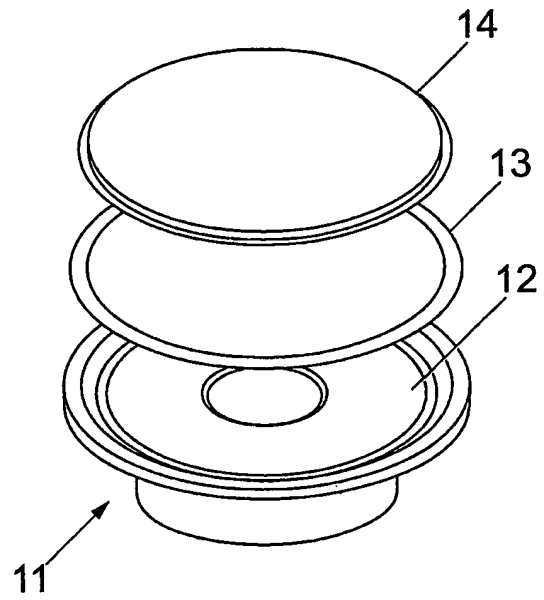
15

16 14. A method as claimed in Claim 11 or Claim 12  
17 comprising the steps of the supply and distribution  
18 of speaker display panels, the origination and  
19 production of panel graphics, the production and  
20 direction of audio messages, the production and  
21 distribution of audio message updates and  
22 distribution of these updates via a communication  
23 device such as the internet, and the updating and  
24 replacement of the artwork on the display panels.

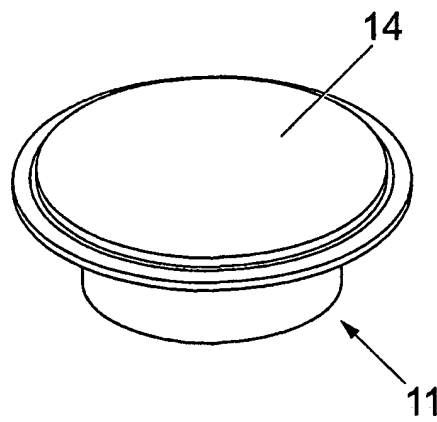
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*Fig. 1*

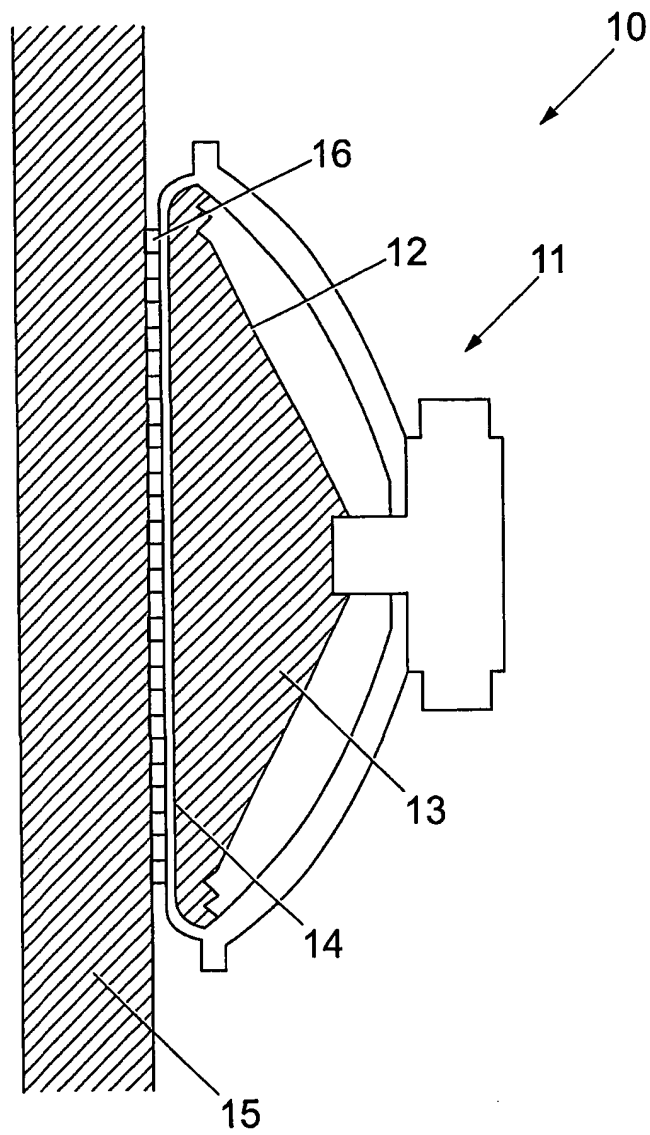


*Fig. 2*



*Fig. 3*

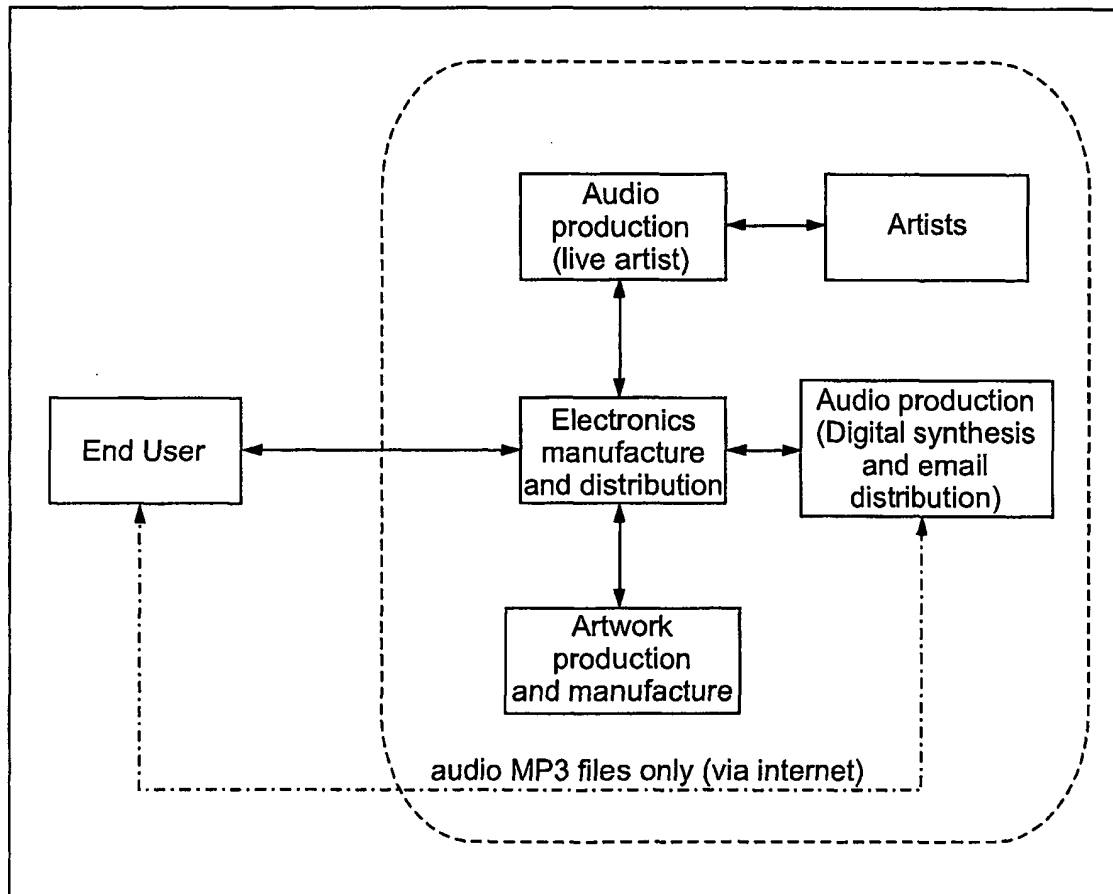
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*Fig. 4*



3 / 3

*Fig. 5*

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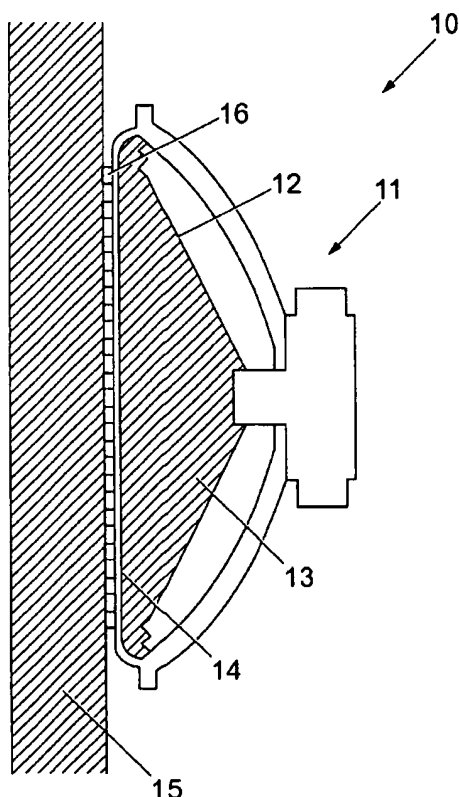
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- (71) Applicant (for all designated States except US): **HARRIS HYND LIMITED** [GB/GB]; Business Innovation Centre, 15 Cromarty Campus, Rosyth Europarc, Fife KY11 2YB (GB).
- (72) Inventors; and  
(75) Inventors/Applicants (for US only): **HYND, Ian, Alexander** [GB/GB]; 8 Lovedale Crescent, Balerno, Midlothian EH14 7DP (GB). **HARRIS, Norman, Richard** [GB/GB]; Shoemakers Cottage, Tanhouse Brae, Culross, Fife KY12 8HX (GB).
- (74) Agent: **KENNEDYS PATENT AGENCY LIMITED**; 29 St. Vincent Place, Glasgow G1 2DT (GB).
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[Continued on next page]

(54) Title: **SPEAKER ARRANGEMENT**



(57) Abstract: There is described a speaker arrangement (10) which comprises a sound emitting element which is formed of a standard loudspeaker (11) having a cone (12). The cone (12) is filled with a filling material (13) which is inserted into the interior of the cone (12). There is also described a method of providing display panels, the display panels incorporating an audio player and speaker, the method comprising the steps of supplying and distributing display panels incorporating a speaker, designing and producing panel graphics to be displayed on the display panels, producing and directing audio messages, producing and distributing of the audio messages to a consumer, and updating and replacing the art work on the graphic panels when necessary.



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## INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 02/01109

A. CLASSIFICATION OF SUBJECT MATTER  
 IPC 7 H04R7/04 H04R1/02 H04R7/12

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 H04R

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4 478 309 A (KAWAMURA SHINICHIRO ET AL) 23 October 1984 (1984-10-23)	1-6
Y	column 1, paragraph 7 -column 3, line 13; figure 1	8,11
Y	US 4 275 278 A (SAKURAI SADA AKI ET AL) 23 June 1981 (1981-06-23)	8,11
	column 2, line 54 -column 3, line 2; figure 1	
X	WO 97 09842 A (AZIMA HENRY ;HARRIS NEIL (GB); COLLOMS MARTIN (GB); VERITY GROUP P) 13 March 1997 (1997-03-13)	1-3,5,6, 10
	page 52, line 12 -page 53, line 21; figure 8	
	--- -/--	

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

## \* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"Z" document member of the same patent family

Date of the actual completion of the international search

28 February 2003

Date of mailing of the international search report

15.05.03

Name and mailing address of the ISA

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Gerken, S

## INTERNATIONAL SEARCH REPORT

International Application No

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## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 3 861 495 A (PEARSON JOHN R) 21 January 1975 (1975-01-21) column 1, line 30 -column 2, line 20; claim 5; figures 1,2 -----	1-3,5,6, 11

# INTERNATIONAL SEARCH REPORT

international application No.  
PCT/GB 02/01109

## Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:  
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. ☐ Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

## Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1-11

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/GB 02/01109

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

### 1. Claims: 1-11

A speaker arrangement comprising a sound emitting element, which may have the form of a cone, the sound emitting element being filled with a material which abuts a planar resonating and sound producing surface. Object: To enhance the quality of the sound emitted from the resonating surface.

### 2. Claims: 12-14

A method of providing display panels comprising the steps of supplying and distributing display panels incorporating an audio player such as an MP3-player and a speaker, designing and producing panel graphics to be displayed on the display panels, producing audio messages and distributing them to a consumer, preferably via a communication link such as the Internet, and updating and replacing the art work on the graphic panels when necessary. Object: To provide a turnkey system wherein all customer needs in obtaining and maintaining display panels are catered for.

Apart from the trivial feature that a loudspeaker is provided there are no overlapping features in the above inventions 1 and 2. Hence, there is a priori no common concept linking said inventions so as to form a single general inventive concept (Rule 13.1 PCT).

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